U.S. GEULUGICAL SURVEY

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unit contains middle Coniacian fauna 330 m above base and at top (Ryer, 1976). Thickness 800-1,100 m in Coalville area. Thickness 1,600 m in East Canyon Creek area.

Oyster Ridge Sandstone Member—Light-yellow to gray marine. andstone and pebbly sandstone locally overlain by nonn andstone, siltstone, and silty shale. Contains early middle Turonian ammonite, Collignoniceras woolgari (Cobban and Reeside, 1952). Thickness 60-100 m Kill Lower member—Light- to dark-gray marine shale, sandstone, conglomeratic sandstone, and silty shale; coak and gray, light-red, grayish-red, and green claystone. Contains earliest Turonian fossils about 1,000 m above base and early middle Turonian fossils in the upper 240 m in Coalville area (Ryer, 1976). Conglomerate facies-Conglomerate containing interbeds of sandstone and, rarely, of red and gray clay. Conglomerate from the Mesozoic and upper Paleozoic section. Locally contains boulders as much as 1 m in diameter. Three tongues of

ksj Sage Junction Formation (Lower Cretaceous)—Light-gray and pinkish-gray mudstone; yellowish-gray, light-brown, and gray siltstone and fine-grained sandstone; and interbeds of white, green, and pink porcellanite. Exposed only near and south of December Didne. cupine Ridge as incomplete sections Coleville Formation (Lower Cretaceous)—Interbedded dark-gray, carbonaceous, shaly mudstone and siltstone, yellowish-grayweathering sandstone, and very fossiliterous gray to tan limestone and coquina. Occurs only in upper Chalk Creek area. About 500 m

CORRELATION OF MAP UNITS

Kti Thomas Fork Formation (Lower Cretaceous)—Pale-red and reddishbrown mudstone and gray and yellowish-gray sandstone and gritty sandstone. Occurs only in upper Chalk Creek area where incomplete section is at least several hundred meters thick Aspen Shale (Lower Cretaceous)—Dark-gray siliceous shale and silty shale containing abundant scales of teleost fish. Maximum thickness about 160 m north of Peoa; thins to west and north Kelvin Formation (Lower Cretaceous)

Upper member—Yellowish-gray, grayish-red, and light- to moderatered sandstone; gray, reddish-brown, and grayish-red siltstone and
claystone; and conglomerate. Conglomerate beds thicker and

and flowage of salt, anhydrite, and associated shales

Stump Formation and Preuss Sandstone—Shown only in cross

sections A-A' and C-C'

Twin Creek Limestone (Middle Jurassic)—Thin- to medium-bedded, gray, light-gray, and purplish-gray limestone and some beds of grayish-red to brown siltstone and sandstone. Locally fossiliferous. Thickness ranges from 850 m near Parleys Canyon to 400 m near page.

sections A-A' and C-C'

Middle Pennsylvanian PENNSYLVANIAN

Lower Mississippia

Middle Cambrian

Late Archean

phenocrysts are in a microcrystalline to glassy groundmass.

andesite and latite to silica-poor rhyodacite (Bromfield and others, 1977). K-Ar ages of biotite and hornblende range from 33.6 to 37.5 Ma (Bromfield and others, 1977; Crittenden and others, 1973). Thickness exceeds 500 m

data indicate that the rocks range in composition from trace

Light-gray to gray lahar, flow breccia, and tuff-Proportion of

centers. Zircon fission-track age of 35.3 Ma and biotite K-Ar age of 37.5 Ma obtained from flow breccia north of Salt Lake City (Van Hom, 1981). Thickness as much as 500 m in Keetley region

Tuff—Interbedded light-yellow and yellowish-gray, fine-grained tuff, lapilli tuff, volcanic gravel, and thin lahar. Interbedded with and intertonguing upwards into coarse breccia of unit Tkb.

Norwood Tuff (Oligocene and Eocene)-Gray to white tuff, volcanie flow breccias Unit has interheds of polym

Volcanics to the south and finer grained tuff and tuffaceous sediment of the type Norwood Tuff in the Morgan Valley to the north. About 1,000 m thick in deepest part of East Canyon graben

about 900 m above the base in last Canyon graben has biotite K-Ar age of 29.6 Ma (R.F. Marvin, U.S. Geological Survey, written commun., 1982) and zircon fission-track age of 28.6 Ma (C.W. Naeser, U.S. Geological Survey, written commun., 1983). North

of Porterville near a late Eocene fossil locality (Nelson, 1972

K-Ar age of biotite and smidler from tuff about 700 m above the base is 38.5 Ma (Evernden and others, 1964). Along and north of City Creek Canyon north of Salt Lake City, the unit consists of light-gray to moderate-yellowish-brown, tuffaceous siltstone and mudstone, gray to pale-brown sandstone, light-gray, tuffaceous limestone, and tuff, the tuff has a zircon fission-track age of 37.4 Ma (Van Horn, 1961). In Promisic Pulce

and, locally, quartz in a fine-grained matrix of potassic feldspar, plagicolase, and quartz; porphyry forms a large composite pluton northwest of Heber Valley. On the basis of biotite K-Ar ages, unit is probably about 35–37 Ma old; hornblende K-Ar ages are 40–42 Ma

Monzonite (Oligocene or Eocene?)-Dark-gray, fine- to medium

Monzonite (Oligocene or Eocene?)—Dark-gray, fine- to medium-grained, hypersthene-bearing, augite-hornblende-biotite mon-zonite; forms Clayton Peak stock. On the basis of biotite K-Ar ages, unit is about 35.6 Ma old, zircon fission-track ages are about 40 Ma (Bromfield and others, 1977: Critenden and others, 1973) Lamproite (Eocene)—Dikes, plugs, and flows containing phenocrysts of phlogopite and diopside in a groundmass of phlogopite, diopside, analcite, and glass. Coarser grained varieties also have sanidine and amphibole. At Moon Canyon on southwest margin of Lives Mountains (Moon Canyon on southwest margin of

Unita Mountains, phlogopite from intrusive rock has K-Ar age of 40.9 Ma, and phlogopite from flow has an age of 37.9 Ma (Best and others, 1968)

Fowkes Formation (Eocene)-Occurs only in Porcupine Ridge

Bulldog Hollow Member-White to light-brown tuff, sandy tuff, Wasatch Formation (Eocene and Paleocene)-Moderate-red,

grayish-red, pale-red, reddish-brown, and gray sandstone, con-giomerate, siltstone, and claystone; contains scattered, thin, lenticular beds of light-purplish-gray to light-gray, nonmarine limestone. Conglomerate clasts range from pebble to boulder size and have a varied lithology from diverse sources. Maximum

stratigraphic thickness about 1,500 m in the Mountain Dell

vellowish-gray-weathering conglomerate forms a basal unit as much as 100 m thick overlain by a sequence of variegated

sandstone and siltstone. This sandstone and siltstone is overlain by or interfingers with coarse conglomerate to the south, which was

age (Lamerson, 1982; Jacobson and Nichols, 1982; and this

Palynomorphs indicate the lower 200-300 m is of late P

Hams Fork Member of the Evanston Formation (Upper Creta-ceous)—Medium- to light-gray and greenish-gray siltstone and claystone, light-gray to yellowish-gray and brownish-gray sandstone, and basal pebble to cobble, locally boulder conglomerate.

places. Conglomerate contains clasts of Precambrian quar derived from the Willard thrust sheet to the north of the map a

Pollen indicate a late Campanian to early Maastrichtian age Diorite (Cretaceous)—Homblende diorite, biotite quartz diorite

derived from the Willard thrust sheet to the north of the map area Thickest section is about 800 m on northeast side of Cherry Canyon, east of Wanship in the central part of the quadrangle

and gabbro. K-Ar age of hornblende is 72.4±2.1 Ma from a sample near Mill A Gulch on the north side of Big Cottonwood

Creek (James and McKee, 1985)

Adaville and Hilliard Formations (Upper Cretaceous)—Yellowishgray to white, thinly laminated, crossbedded sandstone containing

some scattered pebbles and beds of pebble conglomerate, class are predominantly sandstone, siliceous shale of the Aspen Shale and chert. A few beds have reddish-brown-weathering concretion

calcareous siltstone containing a few thin lenses of coal. Beds an

lenses of pebble and cobble conglomerate numerous near tor

Upper member—Light-yellowish-gray marine sandstone, gray marine shale, gray to brown siltstone and silty shale, and coal

Conglomerate, which occurs at the base of the unit as a bed 6–30 m hick in the Coalville area, contains rounded pebbles and cobble

along the Weber River valley at Franklin Canyon. In Coalville at

Sandstone contains reddish-brown

Conglomerate dominant

1,200 m north of the Uinta Mountains. In Chalk Creek are

Bromfield and others, 1977)

and south end of Morgan Valley near Porterville, Lithic-c

about 600 m above the base in East Canyon graben

(Van Horn, 1981). In Porcupine Ridge area near porthe

Intrusive rock and breccia-May include some extrusive ro

Flow rock and breccia

Strike and dip of bedding Overturned cobles of sandstone, siltstone, and minor amounts of limestone.

Unit about 1,300 m thick in Turner Hollow area; thins to west and south. About 470 m thick near head of Parleys Canyon

Parleys Member—Light- to pale-gray limestone associated with pale-lavender-gray siltstone containing limestone nodules; reddishbrown siltstone, pale-brown to pale-reddish-brown sandstone, and conglomerate. About 50 m thick

Morrison and Stirum Formations (Lipner and Middle Jurassia) Vertical Horizontal Jms Morrison and Stump Formations (Upper and Middle Jurassic)—
Mapped only north and west of Peoa below the Absaroka

Morrison Formation (Upper Jurassic)—White to grayish-purple Strike and dip of cataclastic foliation sandstone, moderate-red to gravish-purple siltstone, moderat reddish-orange silty sandstone, and gray limestone. A few beds of chert-pebble conglomerate near top. Thickness 80 m

Stump Formation (Upper and Middle Jurassic)—Pale-red and yellow shale and sandstone and gray to yellowish-gray sandstone; greenish-gray, glauconitic limestone at base. Locally contains pelecypods. Thickness 60 m

Preuss Sandstone (Middle Jurassic)—Reddish-brown, grayish-red, and light, to moderate red with randstone, sendstone and with the moderate red with randstone, sendstone and with the moderate red with randstone, sendstone and with catalog number. See sheet 2 and light- to moderate-red silty sandstone, sandstone, and silty shale. Contains anhydrite and salt in the subsurface in the Chalk Creek area and east of Franklin Canyon (Lamerson, 1982). About 300 m thick, but locally has been thickened due to deformation

SOURCES OF GEOLOGIC DATA [Sources marked by asterisk are shown in index]

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Nugget Sandstone (Jurassic? and Triassic?)—Pale-grayish-orange, fine-grained sandstone, and white quartz sandstone. Crossbedded in upper part, planar bedded in lower part. Thickness ranges from 400 m in Parleys Canyon area to 280 m near Peoa Ankareh Formation (Upper and Lower Triassic)—Map unit Tia shown only in cross sections A-A' and C-C'
Upper member (Upper Triassic)—Moderate-red, grayish-red, *5. Bromfield, C. S., and Crittenden, M. D., Jr., 1971, Geologic map of the d grayish-purple mudstone and fine-grained sandstone. Thick-ss about 210 m in Wasatch Range and 110 m in western Uinta Gartra Member (Upper Triassic)—White to pale-purple, massive,

Mahogany Member (Lower Triassic)—Purplish-gray and pale-red sandstone, mudstone, and a few thin limestone beds. Thickness ranges from 260 m in Wasatch Range to 225 m on Farmington Canyon Complex and surrounding rocks in the Wasatch Mountains between Ogden and Bountiful, Utah: U.S. Geological Survey Miscellaneous Investigations Series Map I-1447, scale 1:50,000. Thaynes Limestone (Lower Triassic)—Light-gray, thin- to thick-bedded limestone and brownish-gray siltstone containing beds of light-gray sandstone, pale-red silty limestone, light-gray shaly limestone, and dark-greenish-gray siltstone and shale. Locally contains redermed and containing beds of the containing the contain Bryant, Bruce, reconnaissance mapping.
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Tow Woodside Formation (Lower Triassic)—Grayish-red, grayish-purple, reddish-brown, and moderate-red shale, siltstone, and fine-grained sandstone; thin white limestone beds; and grayish-red siltstone. Locally, a few tens of meters of green or greenish-gray of Red Butte Creek east of Salt Lake City to 300 m near Par Park City Formation and related rocks (Permian)—Fossiliferous and cherty, gray to pinkish-gray limestone, calcareous siltstone, and cherty sandstone; near middle of unit is a dark-gray, phosphatic shale which is about 30 m thick (Meade Peak Phosphatic Shale Member of Phosphoria Formation). Thickness 1:24,000.
1965b, Geology of the Dromedary Peak quadrangle, Utah: U.S. Geological Survey Geologic Quadrangle Map GQ-378, scale 1:24,000.
1965c, Geology of the Mount Aire quadrangle, Salt Lake County, Utah: U.S. Geological Survey Geologic Quadrangle Map GQ-379, scale 1:24,000. ranges from 200 m at Mill Creek southeast of Salt Lake City to

Pw Weber Sandstone (Pennsylvanian)—Pale-yellowish-gray to white, crossbedded, quartzitic and calcareous sandstone containing dev beds of light-gray to white limestone and dolomite. Thickness generally 300–500 m, but ranges from 150 to 750 m south of City Creek Canyon, where thinned by bedding faults and thickened by folding or fault repetition, and 600 m east of head of American Fork Canyon along the south-central edge of the quadrangle. Unit is Middle Pennsylvanian in Wasatch Range (Van Horn and Crittenden, 1988), but in Uinta Mountains upper part may be younger

Po Oquirrh Formation (Pennsylvanian)—Fine- to medium-grained. in incomplete section of the lower part is exposed at the south lorgan Formation (Middle Pennsylvanian) - Grayish-red calcareou silistone and sitty limestone, light-greenish-gray silistone, grayish-red and reddish-brown sandstone, gray fossiliferous limestone containing gray, yellowish-gray, reddish-brown, and pinkish-grayes that and white highly

Pr Round Valley Limestone (Lower Pennsylvanian)—Light-gray weathering, gray to dark-gray, fossiliferous limestone contain gray and reddish-gray chert and interbeds of gray and light-gray gay and reutains-gray creat and interoets of gray and upint-green shale and silistone, grayish-red silly shale, and sandstone and sandy limestone. Pale-reddish-orange silicified fossils are characteristic. Thickness ranges from 300 m in Wasastch Range in City Creek area to 60 m on eastern edge of quadrangle

Doughnut Formation (Upper Mississippian)—Medium-gray, thin-

abundant fossils, a 10-30-m-thick zone of black, greenish, locally reddish shale at the base contains thin beds of greenish, or gray to rusty-weathering, silty limestone. Black shale containing thin beds of dark-gray limestone and rusty-weathering sandstone occurs in Uinta Mountains. Thickness about 130 m in Wasatch Mgb Great Blue Formation (Upper Mississippian)-Pale-gray, thickbedded, line-grained limestone. Identified only in a fault slice nea Black Mountain northeast of Salt Lake City. Thickness 100 m Humbug Formation (Upper Mississippian)—Medium- to dark-gray

of quadrangle, unit contains white to light-gray, tuffaceous and calcareous sandstone and siltstone, lenses of pebble conglomerate, and scattered beds of tuff imestone, dolomite, and limestone breccia containing beds of reddish-brown- to yellowish-gray-brown-weathering sandstone and rare interbeds of red slistone. Thickness 120-280 m

Desert Limestone (Upper and Lower Mississippian)—Thick-bedded dolomite and limestone locally containing abundant lenses and pods of dark-gray chert. A 10-12m-thick zone of black physiciations are the proposition of the bedded linestene. Conglomerate (Oligocene and Eocene?)-Boulder, cobble, and people conglomerate containing tragments of sandstone derived from Mesozoic and upper Paleozoic formations; clasts of Nugget Sandstone (unit JFn) are conspicuous. Contains a few lahars and beds of tuff and volcanic gravel. Locally rich in clasts of volcanic rock in Porcupine Ridge area in northeastern part of quadrangle. phosphatic shale and thin-bedded lin in Wasatch Range. Thickness 140–295 m

Gardison Limestone (Lower Mississippian)—Medium- to dark-gray, thin- to thick-bedded, fossiliferous limestone. Occurs only in Wasatch Range. Thickness about 200 m In the adjoining Ogden 30' × 60' quadrangle to the north, unit mapped as basal member of Norwood Tuff. Maximum thickness Granodiorite porphyry (Oligocene or Eocene?)-Light- to darkgray granodiorite porphyry and quartz monzonite porphyry and, in the Alta stock, granodiorite and porphyritic granodiorite. The Mdg Deseret and Gardison Limestones, undivided

Madison Limestone (Upper and Lower Mississippian) and Upper Devonian rocks-Dark-gray, fine- to coarse-grained Dark-to light-gray, thin- to medium-hedded, fossilife near base. In many places, basal few meters is dolomite underlain by dolomitic shale and sandstone and conglomerate; basal rocks correlate with lower part of Fitchville Formation and the Pinyon Peak Limestone of Late Devonian age (Spreng, 1979). Occurs in Uinta Mountains. Thickness as much as 300 m Fitchville Formation (Lower Mississippian and Upper D chville Formation (Lower Mississippian and Upper Devonian)— Upper part is dark-gray, massive dolomite containing a 1-m-thick bed of white-weathering, gray dolomite at top, lower part consists of pale-gray, massive dolomite with a 0.2–1.3-m-thick bed of locally pebbly sandstone at base. Occurs in Wasatch Range.

Dp Pinkeness about 35 m Pinkeness about 35 m Pinkeness about 35 m Pinyon Peak Limestone (Upper Devonian)—Pale-tan to pale-gray, thin-bedded, nodular limestone containing interbeds of gray shale. Occurs only north and northeast of Salt Lake City. Thickness 50–60 m Postansbury Formation (Upper Devonian)—Pale-gray to yellowishgray, coarse-grained, crossbedded sandstone and calcareous siltstone; yellowish-weathering silty limestone; and grayish-red to bright-red shale. Basal part contains pale-gray to white, laminated

> Devonian rocks, undivided-Shown only in cross section C-C Maxfield Limestone (Middle Cambrian) -- Contains

Co Ophir Formation (Middle Cambrian)—Contains upper member of blocky-weathering, calcareous sandstone, middle member of thin-bedded limestone having yellowish-gray silty laminae; and lower member of olive-gray, micaceous shale. Thickness is in Big and Little Cottonwood Canyons area. North of City Tintic Quartzite (Middle and Lower Cambrian)—Medium-to thick-bedded, fine- to coarse-grained, white, pale-yellowish-gray, and pale-reddish-brown quartzite; conglomeratic beds in lower 100 n Thickness 250–600 m in Wasatch Range. Discontinuous lenses of unit as much as 100 m thick locally are preserved below pre-Late
Devonian unconformity around Uinta Mountains
Mutual Formation (Late Proterozoic)—Grayish-red to red-purple shale and quartzite locally grading into coarse boulder conglomerate Maximum thickness 400 m

Mineral Fork Tillite (Late Proterozoic)—Reddish-brown-weathering

black sandstone containing cobbles and boulders of quartzit. limestone, schist, and granitic rock. Interbedded with black shale Big Cottonwood Formation (Middle Proterozoic)-White, green,

and gray, pale-reddish-brown-weathering quartzite (q) inter-bedded with shale and siltstone (s) that are grayish red and olive green in upper part, brown or greenish gray in middle part, and blue gray in lower part. Thickness about 4,800 m Jinta Mountain Group (Middle Proterozoic) Red Pine Shale—Grayish-black to olive-drab siltstone and shale and thin, discontinuous quartzite and arkose beds. About 900 m thick on South Fork of Weber River. Whole-rock Rb-Sr age 952 Ma $\,$

thick but estimated thickness is complicated by structural Hades Pass unit of Wallace (1972; Sanderson, 1984)-Palecomplexities

Echo Canyon Conglomerate (Upper Cretaceous)—Pale-red to yellowish- gray to light-yellowish-brown cobble conglomerate containing discontinuous lenses of coarse-grained sandstone. Contains very sparse intervals of gray sandstone, siltstone, and claystone, some of which contain pollen of Coniacian to Santonian red, grayish-red, pale-reddish-brown, light-gray, and yellowish-gray quartz sandstone, arkose, and shale; thick, moderate-red, thin, discontinuous shale bed on the south flank. Shale (s) show Mount Watson unit of Wallace (1972; Sanderson, 1984)from Mesozoic or upper Paleozoic rocks. Limestone and chert clasts are sparse. On northwest side of East Canyon graben, unit k-bedded, yellowish-gray to grayish-white, lithic arkose an fine-grained quartzite containing thin, lenticular, olive-drab shale contains angular to subrounded fragments of Paleozoic limestone and upper Paleozoic and Mesozoic sandstone. Boulders are as Little Willow Formation (Early Proterozoic?)
Biotite-muscovite-quartz schist, quartz schist, muscovite-biotite-plagioclase-quartz gneiss, muscovite-biotite-quartzmuch as 3 m in diameter in lower part. Thickness about 800 m Henefer Formation (Upper Cretaccous)—Light-gray clay, siltstone, sandstone, and conglomerate; red siltstone and clay, and gray plagioclase gneiss, and rare beds of quartz-pebble schist-

subjacent Tertiary stock

Amphibolite—Concordant layers and lenses as much as 100 m thick Farmington Canyon Complex (Early Proterozoic? and Archean)
Pegmatite (Early Proterozoic or Archean)—White, very light gray to very pale orange, plagioclase-quartz-microcline pegmatite. Mapped in one area on Mill Creek southeast of Bountiful. May

yenowsi-green quartitie in beds as much as 10 m thick. Quartitie
dominates much of the unit, has a grain size of 4–5 mm; contains
some light-green muscovite and a few heavy mineral partings.

Contact with unit Afs is gradational

Farmington Canyon Complex, undivided—Shown only in cross
section B—B' Fault—Dashed where approximate or inferred; dotted where concealed. Many faults have a complex history; only the sense of on cross section by arrow, double-headed arrow indicates opposite movement sense at different times. A away from observer, T, toward observer --- High-angle-Bar and ball on downthrown side

MAP I-1944 (SHEET 1 OF 2)

Schist and gneiss (Archean)—Biotite-feldspar-quartz gneiss, garnet-biotite-feldspar-quartz gneiss, sillimanite-biotite schist, sillimanite-garnet-biotite schist and gneiss, hornblende-biotite schist and gneiss hornblende-biotite schist and gneiss hornblende-biotite schist and gneiss hornblende-biotite

nist, and less abundant layers of white, coarse-grained quartzite; uses and layers of amphibolite. Pegmatite dikes and sills;

pegmatites with sharp contacts tend to be discordant and to cu those with indistinct contacts. Discordant pegmatites with share

contacts are generally 10-30 m long, but a few are several

Schist, gneiss, and quartzite (Archean)—Includes biotite-feldspar-quartz schist, sillimanite-biotite schist, sillimanite-garnet-biotite schist and gneiss, and interlayered, coarse-grained, white to paleyellowish-green quartzite in beds as much as 10 m thick. Quartzit

Thrust—Sawteeth on upper plate Folds-Arrow shows direction of plunge where known. Dashed Overturned anticline Syncline

Overturned syncline

Strike and dip of foliation and compositional layering where Strike and dip of foliation Inclined

10 -- Bearing and plunge of mineral lineation-May be combined with • Palynomorph locality-Showing U.S. Geological Survey Denver

map of the Heber quadrangle, Wasatch and Summit Counties, Utah: U.S. Geological Survey Geologic Quadrangle Map GQ-864, scale

Park City East quadrangle, Summit and Wasatch Counties, Utah: U.S. Geological Survey Geologic Quadrangle Map GQ-852, scale 1:24,000.

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